



SEQUENCE LISTING

(1) GENERAL INFORMATION:

- 5 (i) APPLICANT: Eaton, Dan L.  
de Sauvage, Frederic J.
- (ii) TITLE OF INVENTION: HUMAN MPL LIGAND
- 10 (iii) NUMBER OF SEQUENCES: 30
- (iv) CORRESPONDENCE ADDRESS:  
15 (A) ADDRESSEE: Genentech, Inc.  
(B) STREET: 460 Point San Bruno Blvd  
(C) CITY: South San Francisco  
(D) STATE: California  
(E) COUNTRY: USA  
(F) ZIP: 94080
- 20 (v) COMPUTER READABLE FORM:  
(A) MEDIUM TYPE: 3.5 inch, 1.44 Mb floppy disk  
(B) COMPUTER: IBM PC compatible  
(C) OPERATING SYSTEM: PC-DOS/MS-DOS  
25 (D) SOFTWARE: WinPatin (Genentech)
- (vi) CURRENT APPLICATION DATA:  
(A) APPLICATION NUMBER: 08/223263  
(B) FILING DATE: 04-Apr-1994  
(C) CLASSIFICATION:
- C 30 (vii) PRIOR APPLICATION DATA:  
(A) APPLICATION NUMBER: 08/196689  
(B) FILING DATE: 15-FEB-1994
- 35 (vii) PRIOR APPLICATION DATA:  
(A) APPLICATION NUMBER: 08/185607  
(B) FILING DATE: 21-JAN-1994
- 40 (vii) PRIOR APPLICATION DATA:  
(A) APPLICATION NUMBER: 08/176553  
(B) FILING DATE: 3-JAN-1994
- (viii) ATTORNEY/AGENT INFORMATION:  
45 (A) NAME: Winter, Daryl B.  
(B) REGISTRATION NUMBER: 32,637  
(C) REFERENCE/DOCKET NUMBER: P0871P3
- (ix) TELECOMMUNICATION INFORMATION:  
50 (A) TELEPHONE: 415/225-1249  
(B) TELEFAX: 415/952-9881  
(C) TELEX: 910/371-7168

(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 353 amino acids

(B) TYPE: Amino Acid

(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

10 Met Glu Leu Thr Glu Leu Leu Leu Val Val Met Leu Leu Leu Thr  
-21 -20 -15 -10

Ala Arg Leu Thr Leu Ser Ser Pro Ala Pro Pro Ala Cys Asp Leu  
-5 1 5

15 Arg Val Leu Ser Lys Leu Leu Arg Asp Ser His Val Leu His Ser  
10 15 20

20 Arg Leu Ser Gln Cys Pro Glu Val His Pro Leu Pro Thr Pro Val  
25 30 35

Leu Leu Pro Ala Val Asp Phe Ser Leu Gly Glu Trp Lys Thr Gln  
40 45 50

25 Met Glu Glu Thr Lys Ala Gln Asp Ile Leu Gly Ala Val Thr Leu  
55 60 65

*C1*  
*cont.*  
30 Leu Leu Glu Gly Val Met Ala Ala Arg Gly Gln Leu Gly Pro Thr  
70 75 80

Cys Leu Ser Ser Leu Leu Gly Gln Leu Ser Gly Gln Val Arg Leu  
85 90 95

35 Leu Leu Gly Ala Leu Gln Ser Leu Leu Gly Thr Gln Leu Pro Pro  
100 105 110

Gln Gly Arg Thr Thr Ala His Lys Asp Pro Asn Ala Ile Phe Leu  
115 120 125

40 Ser Phe Gln His Leu Leu Arg Gly Lys Val Arg Phe Leu Met Leu  
130 135 140

Val Gly Gly Ser Thr Leu Cys Val Arg Arg Ala Pro Pro Thr Thr  
145 150 155

45 Ala Val Pro Ser Arg Thr Ser Leu Val Leu Thr Leu Asn Glu Leu  
160 165 170

50 Pro Asn Arg Thr Ser Gly Leu Leu Glu Thr Asn Phe Thr Ala Ser  
175 180 185

Ala Arg Thr Thr Gly Ser Gly Leu Leu Lys Trp Gln Gln Gly Phe  
190 195 200

5 Arg Ala Lys Ile Pro Gly Leu Leu Asn Gln Thr Ser Arg Ser Leu  
205 210 215

Asp Gln Ile Pro Gly Tyr Leu Asn Arg Ile His Glu Leu Leu Asn  
220 225 230

10 Gly Thr Arg Gly Leu Phe Pro Gly Pro Ser Arg Arg Thr Leu Gly  
235 240 245

Ala Pro Asp Ile Ser Ser Gly Thr Ser Asp Thr Gly Ser Leu Pro  
250 255 260

15 Pro Asn Leu Gln Pro Gly Tyr Ser Pro Ser Pro Thr His Pro Pro  
265 270 275

20 Thr Gly Gln Tyr Thr Leu Phe Pro Leu Pro Pro Thr Leu Pro Thr  
280 285 290

Pro Val Val Gln Leu His Pro Leu Leu Pro Asp Pro Ser Ala Pro  
295 300 305

25 Thr Pro Thr Pro Thr Ser Pro Leu Leu Asn Thr Ser Tyr Thr His  
310 315 320

*cont.*  
30

Ser Gln Asn Leu Ser Gln Glu Gly  
325 330 332

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- 35 (A) LENGTH: 1795 base pairs  
(B) TYPE: Nucleic Acid  
(C) STRANDEDNESS: Single  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

40

TCTTCCTACC CATCTGCTCC CCAGAGGGCT GCCTGCTGTG CACTTGGGTC 50  
CTGGAGCCCT TCTCCACCCG GATAGATTCC TCACCCTTGG CCCGCCTTTG 100  
45 CCCACCCCTA CTCTGCCCAG AAGTGCAAGA GCCTAAGCCG CCTCCATGGC 150  
CCCAGGAAGG ATTCAGGGGA GAGGCCCCAA ACAGGGAGCC ACGCCAGCCA 200  
50 GACACCCCGG CCAGA ATG GAG CTG ACT GAA TTG CTC CTC 239  
Met Glu Leu Thr Glu Leu Leu Leu  
-21 -20 -15

	GTG	GTC	ATG	CTT	CTC	CTA	ACT	GCA	AGG	CTA	ACG	CTG	TCC	278
	Val	Val	Met	Leu	Leu	Leu	Thr	Ala	Arg	Leu	Thr	Leu	Ser	
				-10					-5					

5	AGC	CCG	GCT	CCT	CCT	GCT	TGT	GAC	CTC	CGA	GTC	CTC	AGT	317
	Ser	Pro	Ala	Pro	Pro	Ala	Cys	Asp	Leu	Arg	Val	Leu	Ser	
	1				5					10				

10	AAA	CTG	CTT	CGT	GAC	TCC	CAT	GTC	CTT	CAC	AGC	AGA	CTG	356
	Lys	Leu	Leu	Arg	Asp	Ser	His	Val	Leu	His	Ser	Arg	Leu	
		15					20					25		

15	AGC	CAG	TGC	CCA	GAG	GTT	CAC	CCT	TTG	CCT	ACA	CCT	GTC	395
	Ser	Gln	Cys	Pro	Glu	Val	His	Pro	Leu	Pro	Thr	Pro	Val	
				30					35					

20	CTG	CTG	CCT	GCT	GTG	GAC	TTT	AGC	TTG	GGA	GAA	TGG	AAA	434
	Leu	Leu	Pro	Ala	Val	Asp	Phe	Ser	Leu	Gly	Glu	Trp	Lys	
	40					45					50			

	ACC	CAG	ATG	GAG	GAG	ACC	AAG	GCA	CAG	GAC	ATT	CTG	GGA	473
	Thr	Gln	Met	Glu	Glu	Thr	Lys	Ala	Gln	Asp	Ile	Leu	Gly	
			55					60					65	

25	GCA	GTG	ACC	CTT	CTG	CTG	GAG	GGA	GTG	ATG	GCA	GCA	CGG	512
	Ala	Val	Thr	Leu	Leu	Leu	Glu	Gly	Val	Met	Ala	Ala	Arg	
					70					75				

30	GGA	CAA	CTG	GGA	CCC	ACT	TGC	CTC	TCA	TCC	CTC	CTG	GGG	551
	Gly	Gln	Leu	Gly	Pro	Thr	Cys	Leu	Ser	Ser	Leu	Leu	Gly	
		80					85					90		

35	CAG	CTT	TCT	GGA	CAG	GTC	CGT	CTC	CTC	CTT	GGG	GCC	CTG	590
	Gln	Leu	Ser	Gly	Gln	Val	Arg	Leu	Leu	Leu	Gly	Ala	Leu	
				95					100					

40	CAG	AGC	CTC	CTT	GGA	ACC	CAG	CTT	CCT	CCA	CAG	GGC	AGG	629
	Gln	Ser	Leu	Leu	Gly	Thr	Gln	Leu	Pro	Pro	Gln	Gly	Arg	
	105					110					115			

	ACC	ACA	GCT	CAC	AAG	GAT	CCC	AAT	GCC	ATC	TTC	CTG	AGC	668
	Thr	Thr	Ala	His	Lys	Asp	Pro	Asn	Ala	Ile	Phe	Leu	Ser	
			120				125						130	

45	TTC	CAA	CAC	CTG	CTC	CGA	GGA	AAG	GTG	CGT	TTC	CTG	ATG	707
	Phe	Gln	His	Leu	Leu	Arg	Gly	Lys	Val	Arg	Phe	Leu	Met	
				135						140				

50	CTT	GTA	GGA	GGG	TCC	ACC	CTC	TGC	GTC	AGG	CGG	GCC	CCA	746
	Leu	Val	Gly	Gly	Ser	Thr	Leu	Cys	Val	Arg	Arg	Ala	Pro	
		145					150					155		

	CCC	ACC	ACA	GCT	GTC	CCC	AGC	AGA	ACC	TCT	CTA	GTC	CTC	785
	Pro	Thr	Thr	Ala	Val	Pro	Ser	Arg	Thr	Ser	Leu	Val	Leu	
				160					165					
5	ACA	CTG	AAC	GAG	CTC	CCA	AAC	AGG	ACT	TCT	GGA	TTG	TTG	824
	Thr	Leu	Asn	Glu	Leu	Pro	Asn	Arg	Thr	Ser	Gly	Leu	Leu	
	170					175					180			
10	GAG	ACA	AAC	TTC	ACT	GCC	TCA	GCC	AGA	ACT	ACT	GGC	TCT	863
	Glu	Thr	Asn	Phe	Thr	Ala	Ser	Ala	Arg	Thr	Thr	Gly	Ser	
			185					190					195	
15	GGG	CTT	CTG	AAG	TGG	CAG	CAG	GGA	TTC	AGA	GCC	AAG	ATT	902
	Gly	Leu	Leu	Lys	Trp	Gln	Gln	Gly	Phe	Arg	Ala	Lys	Ile	
				200						205				
20	CCT	GGT	CTG	CTG	AAC	CAA	ACC	TCC	AGG	TCC	CTG	GAC	CAA	941
	Pro	Gly	Leu	Leu	Asn	Gln	Thr	Ser	Arg	Ser	Leu	Asp	Gln	
		210					215					220		
25	ATC	CCC	GGA	TAC	CTG	AAC	AGG	ATA	CAC	GAA	CTC	TTG	AAT	980
	Ile	Pro	Gly	Tyr	Leu	Asn	Arg	Ile	His	Glu	Leu	Leu	Asn	
				225					230					
30	GGA	ACT	CGT	GGA	CTC	TTT	CCT	GGA	CCC	TCA	CGC	AGG	ACC	1019
	Gly	Thr	Arg	Gly	Leu	Phe	Pro	Gly	Pro	Ser	Arg	Arg	Thr	
	235					240					245			
35	CTA	GGA	GCC	CCG	GAC	ATT	TCC	TCA	GGA	ACA	TCA	GAC	ACA	1058
	Leu	Gly	Ala	Pro	Asp	Ile	Ser	Ser	Gly	Thr	Ser	Asp	Thr	
			250					255					260	
40	GGC	TCC	CTG	CCA	CCC	AAC	CTC	CAG	CCT	GGA	TAT	TCT	CCT	1097
	Gly	Ser	Leu	Pro	Pro	Asn	Leu	Gln	Pro	Gly	Tyr	Ser	Pro	
				265						270				
45	TCC	CCA	ACC	CAT	CCT	CCT	ACT	GGA	CAG	TAT	ACG	CTC	TTC	1136
	Ser	Pro	Thr	His	Pro	Pro	Thr	Gly	Gln	Tyr	Thr	Leu	Phe	
		275					280					285		
50	CCT	CTT	CCA	CCC	ACC	TTG	CCC	ACC	CCT	GTG	GTC	CAG	CTC	1175
	Pro	Leu	Pro	Pro	Thr	Leu	Pro	Thr	Pro	Val	Val	Gln	Leu	
				290					295					
55	CAC	CCC	CTG	CTT	CCT	GAC	CCT	TCT	GCT	CCA	ACG	CCC	ACC	1214
	His	Pro	Leu	Leu	Pro	Asp	Pro	Ser	Ala	Pro	Thr	Pro	Thr	
	300					305					310			
60	CCT	ACC	AGC	CCT	CTT	CTA	AAC	ACA	TCC	TAC	ACC	CAC	TCC	1253
	Pro	Thr	Ser	Pro	Leu	Leu	Asn	Thr	Ser	Tyr	Thr	His	Ser	
			315					320					325	

CAG AAT CTG TCT CAG GAA GGG T AAGGT TCTCAGACAC 1290  
 Gln Asn Leu Ser Gln Glu Gly  
                   330          332

5 TGCCGACATC AGCATTGTCT CATGTACAGC TCCCTTCCCT GCAGGGCGCC 1340  
 CCTGGGAGAC AACTGGACAA GATTTCTTAC TTTCTCCTGA AACCCAAAGC 1390  
 10 CCTGGTAAAA GGGATACACA GGAAGTAAAA GGGAATCATT TTTCACCTGT 1440  
 CATTATAAAC CTTGAGAAGC TATTTTTTTTA AGCTATCAGC AATACTCATC 1490  
 AGAGCAGCTA GCTCTTTGGT CTATTTTCTG CAGAAATTTG CAACTCACTG 1540  
 15 ATTCTCTACA TGCTCTTTTT CTGTGATAAC TCTGCAAAGG CCTGGGCTGG 1590  
 CCTGGCAGTT GAACAGAGGG AGAGACTAAC CTTGAGTCAG AAAACAGAGA 1640  
 AAGGGTAATT TCCTTTGCTT CAAATTCAAG GCCTTCCAAC GCCCCATCC 1690  
 20 CCTTTACTAT CATTCTCAGT GGGACTCTGA TCCCATATTC TTAACAGATC 1740  
 TTTACTCTTG AGAAATGAAT AAGCTTTCTC TCAGAAAAAA AAAAAAAAAA 1790  
 25 AAAAA 1795

*C' cont.*  
 (2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 42 amino acids
- (B) TYPE: Amino Acid
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

35 Leu Leu Leu Val Val Met Leu Leu Leu Thr Ala Arg Leu Thr Leu  
     -16 -15                  -10                  -5  
 40 Ser Ser Pro Ala Pro Pro Ala Cys Asp Leu Arg Val Leu Ser Lys  
       1                  5                  10  
 Leu Leu Arg Asp Ser His Val Leu His Ser Arg Leu  
   15                  20                  25 26

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 390 base pairs
- (B) TYPE: Nucleic Acid
- (C) STRANDEDNESS: Single
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

GAATTCCTGG AATACCAGCT GACAATGATT TCCTCCTCAT CTTTCAACCT 50  
5 CACCTCTCCT CATCTAAGAA TTG CTC CTC GTG GTC ATG CTT 91  
Leu Leu Leu Val Val Met Leu  
-16 -15 -10  
10 CTC CTA ACT GCA AGG CTA ACG CTG TCC AGC CCG GCT CCT 130  
Leu Leu Thr Ala Arg Leu Thr Leu Ser Ser Pro Ala Pro  
-5 1  
15 CCT GCT TGT GAC CTC CGA GTC CTC AGT AAA CTG CTT CGT 169  
Pro Ala Cys Asp Leu Arg Val Leu Ser Lys Leu Leu Arg  
5 10 15  
20 GAC TCC CAT GTC CTT CAC AGC AGA CTG GTGA GAACTCCCAA 210  
Asp Ser His Val Leu His Ser Arg Leu  
20 25 26  
CATTATCCCC TTTATCCGCG TAACTGGTAA GACACCCATA CTCCCAGGAA 260  
GACACCATCA CTTCTCTTAA CTCCTTGACC CAATGACTAT TCTTCCCATA 310  
25 TTGTCCCCAC CTA CTGATCA CACTCTCTGA CAAGAATTAT TCTTCACAAT 360  
c' cont. ACAGCCCGCA TTAAAAGCT CTCGTCTAGA 390

(2) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 390 base pairs  
(B) TYPE: Nucleic Acid  
35 (C) STRANDEDNESS: Single  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

40 TCTAGACGAG AGCTTTTAAA TGCGGGCTGT ATTGTGAAGA ATAATTCTTG 50  
TCAGAGAGTG TGATCAGTAG GTGGGGACAA TATGGGAAGA ATAGTCATTG 100  
45 GGTCAAGGAG TTAGAGGAAG TGATGGTGTC TTCCTGGGAG TATGGGTGTC 150  
TTACCAGTTA CGCGGATAAA GGGGATAATG TTGGGAGTTC TCACCAGTCT 200  
GCTGTGAAGG ACATGGGAGT CACGAAGCAG TTTACTGAGG ACTCGGAGGT 250  
50 CACAAGCAGG AGGAGCCGGG CTGGACAGCG TTAGCCTTGC AGTTAGGAGA 300

AGCATGACCA CGAGGAGCAA TTCTTAGATG AGGAGAGGTG AGGTTGAAAG 350

ATGAGGAGGA AATCATTGTC AGCTGGTATT CCAGGAATTC 390

5 (2) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 332 amino acids

(B) TYPE: Amino Acid

10 (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:6:

15 Ser Pro Ala Pro Pro Ala Cys Asp Leu Arg Val Leu Ser Lys Leu  
1 5 10 15

Leu Arg Asp Ser His Val Leu His Ser Arg Leu Ser Gln Cys Pro  
20 25 30

20 Glu Val His Pro Leu Pro Thr Pro Val Leu Leu Pro Ala Val Asp  
35 40 45

Phe Ser Leu Gly Glu Trp Lys Thr Gln Met Glu Glu Thr Lys Ala  
50 55 60

25 Gln Asp Ile Leu Gly Ala Val Thr Leu Leu Leu Glu Gly Val Met  
65 70 75

30 Ala Ala Arg Gly Gln Leu Gly Pro Thr Cys Leu Ser Ser Leu Leu  
80 85 90

Gly Gln Leu Ser Gly Gln Val Arg Leu Leu Leu Gly Ala Leu Gln  
95 100 105

35 Ser Leu Leu Gly Thr Gln Leu Pro Pro Gln Gly Arg Thr Thr Ala  
110 115 120

His Lys Asp Pro Asn Ala Ile Phe Leu Ser Phe Gln His Leu Leu  
125 130 135

40 Arg Gly Lys Val Arg Phe Leu Met Leu Val Gly Gly Ser Thr Leu  
140 145 150

45 Cys Val Arg Arg Ala Pro Pro Thr Thr Ala Val Pro Ser Arg Thr  
155 160 165

Ser Leu Val Leu Thr Leu Asn Glu Leu Pro Asn Arg Thr Ser Gly  
170 175 180

50 Leu Leu Glu Thr Asn Phe Thr Ala Ser Ala Arg Thr Thr Gly Ser  
185 190 195





	Val	Glu	Val	Trp	Gln	Gly	Leu	Ala	Leu	Leu	Ser	Glu	Ala	Val	Leu
					65					70					75
5	Arg	Gly	Gln	Ala	Leu	Leu	Val	Asn	Ser	Ser	Gln	Pro	Trp	Glu	Pro
					80					85					90
	Leu	Gln	Leu	His	Val	Asp	Lys	Ala	Val	Ser	Gly	Leu	Arg	Ser	Leu
					95					100					105
10	Thr	Thr	Leu	Leu	Arg	Ala	Leu	Gly	Ala	Gln	Lys	Glu	Ala	Ile	Ser
					110					115					120
	Pro	Pro	Asp	Ala	Ala	Ser	Ala	Ala	Pro	Leu	Arg	Thr	Ile	Thr	Ala
					125					130					135
15	Asp	Thr	Phe	Arg	Lys	Leu	Phe	Arg	Val	Tyr	Ser	Asn	Phe	Leu	Arg
					140					145					150
20	Gly	Lys	Leu	Lys	Leu	Tyr	Thr	Gly	Glu	Ala	Cys	Arg	Thr	Gly	Asp
					155					160					165
	Arg														
	166														

25 (2) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 1443 base pairs  
 (B) TYPE: Nucleic Acid  
 (C) STRANDEDNESS: Single  
 (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

35 GAGTCCTTGG CCCACCTCTC TCCCACCCGA CTCTGCCGAA AGAAGCACAG 50

AAGCTCAAGC CGCCTCCATG GCCCCAGGAA AGATTCAGGG GAGAGGCCCC 100

40 ATACAGGGAG CCACTTCAGT TAGACACCCT GGCCAGA ATG GAG 143  
 Met Glu  
 -21 -20

45 CTG ACT GAT TTG CTC CTG GCG GCC ATG CTT CTT GCA GTG 182  
 Leu Thr Asp Leu Leu Leu Ala Ala Met Leu Leu Ala Val  
 -15 -10

50 GCA AGA CTA ACT CTG TCC AGC CCC GTA GCT CCT GCC TGT 221  
 Ala Arg Leu Thr Leu Ser Ser Pro Val Ala Pro Ala Cys  
 -5 1 5

	GAC	CCC	AGA	CTC	CTA	AAT	AAA	CTG	CTG	CGT	GAC	TCC	CAC	260
	Asp	Pro	Arg	Leu	Leu	Asn	Lys	Leu	Leu	Arg	Asp	Ser	His	
			10					15					20	
5	CTC	CTT	CAC	AGC	CGA	CTG	AGT	CAG	TGT	CCC	GAC	GTC	GAC	299
	Leu	Leu	His	Ser	Arg	Leu	Ser	Gln	Cys	Pro	Asp	Val	Asp	
					25					30				
10	CCT	TTG	TCT	ATC	CCT	GTT	CTG	CTG	CCT	GCT	GTG	GAC	TTT	338
	Pro	Leu	Ser	Ile	Pro	Val	Leu	Leu	Pro	Ala	Val	Asp	Phe	
		35					40					45		
15	AGC	CTG	GGA	GAA	TGG	AAA	ACC	CAG	ACG	GAA	CAG	AGC	AAG	377
	Ser	Leu	Gly	Glu	Trp	Lys	Thr	Gln	Thr	Glu	Gln	Ser	Lys	
				50					55					
20	GCA	CAG	GAC	ATT	CTA	GGG	GCA	GTG	TCC	CTT	CTA	CTG	GAG	416
	Ala	Gln	Asp	Ile	Leu	Gly	Ala	Val	Ser	Leu	Leu	Leu	Glu	
	60					65					70			
	GGA	GTG	ATG	GCA	GCA	CGA	GGA	CAG	TTG	GAA	CCC	TCC	TGC	455
	Gly	Val	Met	Ala	Ala	Arg	Gly	Gln	Leu	Glu	Pro	Ser	Cys	
			75				80						85	
25	CTC	TCA	TCC	CTC	CTG	GGA	CAG	CTT	TCT	GGG	CAG	GTT	CGC	494
	Leu	Ser	Ser	Leu	Leu	Gly	Gln	Leu	Ser	Gly	Gln	Val	Arg	
					90					95				
30	CTC	CTC	TTG	GGG	GCC	CTG	CAG	GGC	CTC	CTA	GGA	ACC	CAG	533
	Leu	Leu	Leu	Gly	Ala	Leu	Gln	Gly	Leu	Leu	Gly	Thr	Gln	
		100					105					110		
35	GGC	AGG	ACC	ACA	GCT	CAC	AAG	GAC	CCC	AAT	GCC	CTC	TTC	572
	Gly	Arg	Thr	Thr	Ala	His	Lys	Asp	Pro	Asn	Ala	Leu	Phe	
				115					120					
40	TTG	AGC	TTG	CAA	CAA	CTG	CTT	CGG	GGA	AAG	GTG	CGC	TTC	611
	Leu	Ser	Leu	Gln	Gln	Leu	Leu	Arg	Gly	Lys	Val	Arg	Phe	
	125					130					135			
	CTG	CTT	CTG	GTA	GAA	GGT	CCC	ACC	CTC	TGT	GTC	AGA	CGG	650
	Leu	Leu	Leu	Val	Glu	Gly	Pro	Thr	Leu	Cys	Val	Arg	Arg	
			140				145						150	
45	ACC	CTG	CCA	ACC	ACA	GCT	GTC	CCA	AGC	AGT	ACT	TCT	CAA	689
	Thr	Leu	Pro	Thr	Thr	Ala	Val	Pro	Ser	Ser	Thr	Ser	Gln	
					155					160				
50	CTC	CTC	ACA	CTA	AAC	AAG	TTC	CCA	AAC	AGG	ACT	TCT	GGA	728
	Leu	Leu	Thr	Leu	Asn	Lys	Phe	Pro	Asn	Arg	Thr	Ser	Gly	
		165					170					175		

TTG TTG GAG ACG AAC TTC AGT GTC ACA GCC AGA ACT GCT 767  
 Leu Leu Glu Thr Asn Phe Ser Val Thr Ala Arg Thr Ala  
 180 185

5 GGC CCT GGA CTT CTG AGC AGG CTT CAG GGA TTC AGA GTC 806  
 Gly Pro Gly Leu Leu Ser Arg Leu Gln Gly Phe Arg Val  
 190 195 200

10 AAG ATT ACT CCT GGT CAG CTA AAT CAA ACC TCC AGG TCC 845  
 Lys Ile Thr Pro Gly Gln Leu Asn Gln Thr Ser Arg Ser  
 205 210 215

15 CCA GTC CAA ATC TCT GGA TAC CTG AAC AGG ACA CAC GGA 884  
 Pro Val Gln Ile Ser Gly Tyr Leu Asn Arg Thr His Gly  
 220 225

20 CCT GTG AAT GGA ACT CAT GGG CTC TTT GCT GGA ACC TCA 923  
 Pro Val Asn Gly Thr His Gly Leu Phe Ala Gly Thr Ser  
 230 235 240

CTT CAG ACC CTG GAA GCC TCA GAC ATC TCG CCC GGA GCT 962  
 Leu Gln Thr Leu Glu Ala Ser Asp Ile Ser Pro Gly Ala  
 245 250

25 TTC AAC AAA GGC TCC CTG GCA TTC AAC CTC CAG GGT GGA 1001  
 Phe Asn Lys Gly Ser Leu Ala Phe Asn Leu Gln Gly Gly  
 255 260 265

30 CTT CCT CCT TCT CCA AGC CTT GCT CCT GAT GGA CAC ACA 1040  
 Leu Pro Pro Ser Pro Ser Leu Ala Pro Asp Gly His Thr  
 270 275 280

35 CCC TTC CCT CCT TCA CCT GCC TTG CCC ACC ACC CAT GGA 1079  
 Pro Phe Pro Pro Ser Pro Ala Leu Pro Thr Thr His Gly  
 285 290

40 TCT CCA CCC CAG CTC CAC CCC CTG TTT CCT GAC CCT TCC 1118  
 Ser Pro Pro Gln Leu His Pro Leu Phe Pro Asp Pro Ser  
 295 300 305

ACC ACC ATG CCT AAC TCT ACC GCC CCT CAT CCA GTC ACA 1157  
 Thr Thr Met Pro Asn Ser Thr Ala Pro His Pro Val Thr  
 310 315

45 ATG TAC CCT CAT CCC AGG AAT TTG TCT CAG GAA ACA TAGCGC 1199  
 Met Tyr Pro His Pro Arg Asn Leu Ser Gln Glu Thr  
 320 325 330 331

50 G GGC ACTGGCC CAGTGAGCGT CTGCAGCTTC TCTCGGGGAC 1240

AAGCTTCCCC AGGAAGGCTG AGAGGCAGCT GCATCTGCTC CAGATGTTCT 1290

GCTTTCACCT AAAAGGCCCT GGGGAAGGGA TACACAGCAC TGGAGATTGT 1340  
 AAAATTTTAG GAGCTATTTT TTTTAACT ATCAGCAATA TTCATCAGAG 1390  
 5 CAGCTAGCGA TCTTTGGTCT ATTTTCGGTA TAAATTTGAA AATCACTAAT 1440  
 TCT 1443

(2) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 352 amino acids
- (B) TYPE: Amino Acid
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

Met Glu Leu Thr Asp Leu Leu Leu Ala Ala Met Leu Leu Ala Val  
 -21 -20 -15 -10  
 20 Ala Arg Leu Thr Leu Ser Ser Pro Val Ala Pro Ala Cys Asp Pro  
 -5 1 5  
 Arg Leu Leu Asn Lys Leu Leu Arg Asp Ser His Leu Leu His Ser  
 25 10 15 20  
 Arg Leu Ser Gln Cys Pro Asp Val Asp Pro Leu Ser Ile Pro Val  
 25 30 35  
 C' cont  
 30 Leu Leu Pro Ala Val Asp Phe Ser Leu Gly Glu Trp Lys Thr Gln  
 40 45 50  
 Thr Glu Gln Ser Lys Ala Gln Asp Ile Leu Gly Ala Val Ser Leu  
 55 60 65  
 35 Leu Leu Glu Gly Val Met Ala Ala Arg Gly Gln Leu Glu Pro Ser  
 70 75 80  
 Cys Leu Ser Ser Leu Leu Gly Gln Leu Ser Gly Gln Val Arg Leu  
 40 85 90 95  
 Leu Leu Gly Ala Leu Gln Gly Leu Leu Gly Thr Gln Gly Arg Thr  
 100 105 110  
 45 Thr Ala His Lys Asp Pro Asn Ala Leu Phe Leu Ser Leu Gln Gln  
 115 120 125  
 Leu Leu Arg Gly Lys Val Arg Phe Leu Leu Leu Val Glu Gly Pro  
 130 135 140  
 50 Thr Leu Cys Val Arg Arg Thr Leu Pro Thr Thr Ala Val Pro Ser  
 145 150 155

Ser Thr Ser Gln Leu Leu Thr Leu Asn Lys Phe Pro Asn Arg Thr  
160 165 170

5 Ser Gly Leu Leu Glu Thr Asn Phe Ser Val Thr Ala Arg Thr Ala  
175 180 185

Gly Pro Gly Leu Leu Ser Arg Leu Gln Gly Phe Arg Val Lys Ile  
190 195 200

10 Thr Pro Gly Gln Leu Asn Gln Thr Ser Arg Ser Pro Val Gln Ile  
205 210 215

Ser Gly Tyr Leu Asn Arg Thr His Gly Pro Val Asn Gly Thr His  
220 225 230

15 Gly Leu Phe Ala Gly Thr Ser Leu Gln Thr Leu Glu Ala Ser Asp  
235 240 245

20 Ile Ser Pro Gly Ala Phe Asn Lys Gly Ser Leu Ala Phe Asn Leu  
250 255 260

Gln Gly Gly Leu Pro Pro Ser Pro Ser Leu Ala Pro Asp Gly His  
265 270 275

25 Thr Pro Phe Pro Pro Ser Pro Ala Leu Pro Thr Thr His Gly Ser  
280 285 290

Pro Pro Gln Leu His Pro Leu Phe Pro Asp Pro Ser Thr Thr Met  
295 300 305

30 Pro Asn Ser Thr Ala Pro His Pro Val Thr Met Tyr Pro His Pro  
310 315 320

35 Arg Asn Leu Ser Gln Glu Thr  
325 330 331

(2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

- 40 (A) LENGTH: 331 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

45 Ser Pro Val Ala Pro Ala Cys Asp Pro Arg Leu Leu Asn Lys Leu  
1 5 10 15

50 Leu Arg Asp Ser His Leu Leu His Ser Arg Leu Ser Gln Cys Pro  
20 25 30

	Asp	Val	Asp	Pro	Leu	Ser	Ile	Pro	Val	Leu	Leu	Pro	Ala	Val	Asp	
					35					40					45	
5	Phe	Ser	Leu	Gly	Glu	Trp	Lys	Thr	Gln	Thr	Glu	Gln	Ser	Lys	Ala	
					50					55					60	
	Gln	Asp	Ile	Leu	Gly	Ala	Val	Ser	Leu	Leu	Leu	Glu	Gly	Val	Met	
					65					70					75	
10	Ala	Ala	Arg	Gly	Gln	Leu	Glu	Pro	Ser	Cys	Leu	Ser	Ser	Leu	Leu	
					80					85					90	
	Gly	Gln	Leu	Ser	Gly	Gln	Val	Arg	Leu	Leu	Leu	Gly	Ala	Leu	Gln	
					95					100					105	
15	Gly	Leu	Leu	Gly	Thr	Gln	Gly	Arg	Thr	Thr	Ala	His	Lys	Asp	Pro	
					110					115					120	
	Asn	Ala	Leu	Phe	Leu	Ser	Leu	Gln	Gln	Leu	Leu	Arg	Gly	Lys	Val	
20					125					130					135	
	Arg	Phe	Leu	Leu	Leu	Val	Glu	Gly	Pro	Thr	Leu	Cys	Val	Arg	Arg	
					140					145					150	
25	Thr	Leu	Pro	Thr	Thr	Ala	Val	Pro	Ser	Ser	Thr	Ser	Gln	Leu	Leu	
					155					160					165	
<i>c' conf.</i>	Thr	Leu	Asn	Lys	Phe	Pro	Asn	Arg	Thr	Ser	Gly	Leu	Leu	Glu	Thr	
					170					175					180	
30	Asn	Phe	Ser	Val	Thr	Ala	Arg	Thr	Ala	Gly	Pro	Gly	Leu	Leu	Ser	
					185					190					195	
	Arg	Leu	Gln	Gly	Phe	Arg	Val	Lys	Ile	Thr	Pro	Gly	Gln	Leu	Asn	
35					200					205					210	
	Gln	Thr	Ser	Arg	Ser	Pro	Val	Gln	Ile	Ser	Gly	Tyr	Leu	Asn	Arg	
					215					220					225	
40	Thr	His	Gly	Pro	Val	Asn	Gly	Thr	His	Gly	Leu	Phe	Ala	Gly	Thr	
					230					235					240	
	Ser	Leu	Gln	Thr	Leu	Glu	Ala	Ser	Asp	Ile	Ser	Pro	Gly	Ala	Phe	
					245					250					255	
45	Asn	Lys	Gly	Ser	Leu	Ala	Phe	Asn	Leu	Gln	Gly	Gly	Leu	Pro	Pro	
					260					265					270	
	Ser	Pro	Ser	Leu	Ala	Pro	Asp	Gly	His	Thr	Pro	Phe	Pro	Pro	Ser	
50					275					280					285	

Pro Ala Leu Pro Thr Thr His Gly Ser Pro Pro Gln Leu His Pro  
290 295 300

5 Leu Phe Pro Asp Pro Ser Thr Thr Met Pro Asn Ser Thr Ala Pro  
305 310 315

His Pro Val Thr Met Tyr Pro His Pro Arg Asn Leu Ser Gln Glu  
320 325 330

10 Thr  
331

(2) INFORMATION FOR SEQ ID NO:11:

15 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 26 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

20 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

Ser Pro Ala Pro Pro Ala Cys Asp Pro Arg Leu Leu Asn Lys Leu  
1 5 10 15

25 Leu Arg Asp Asp Xaa Val Leu His Gly Arg Leu  
20 25 26

C!  
cont.  
(2) INFORMATION FOR SEQ ID NO:12:

30 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 25 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

35 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

Ser Pro Ala Pro Pro Ala Xaa Asp Pro Arg Leu Leu Asn Lys Leu  
1 5 10 15

40 Leu Arg Asp Asp His Val Leu His Gly Arg  
20 25

(2) INFORMATION FOR SEQ ID NO:13:

45 (i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 14 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

50 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:13:



Xaa Pro Ala Pro Pro Ala Xaa Asp Pro Arg Leu Xaa Asn Lys  
1 5 10 14

(2) INFORMATION FOR SEQ ID NO:14:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: Amino Acid
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:14:

Pro Arg Leu Leu Asn Lys Leu Leu Arg  
1 5 9

(2) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 45 base pairs
- (B) TYPE: Nucleic Acid
- (C) STRANDEDNESS: Single
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:15:

GCCGTGAAGG ACGTGGTCGT CACGAAGCAG TTTATTTAGG AGTCG 45

(2) INFORMATION FOR SEQ ID NO:16:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 20 base pairs
- (B) TYPE: Nucleic Acid
- (C) STRANDEDNESS: Single
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:16:

CCNGCNCNC CNGCNTGYGA 20

(2) INFORMATION FOR SEQ ID NO:17:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 21 base pairs
- (B) TYPE: Nucleic Acid
- (C) STRANDEDNESS: Single
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:17:

NCCRTGNARN ACRTGRTCRT C 21

(2) INFORMATION FOR SEQ ID NO:18:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 69 base pairs
- (B) TYPE: Nucleic Acid
- (C) STRANDEDNESS: Double
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:18:

CCAGCGCCGC CAGCCTGTGA CCCCCGACTC CTAAATAAAC TGCCTCGTGA 50

TGACCACGTT CAGCACGGC 69

(2) INFORMATION FOR SEQ ID NO:19:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 69 base pairs
- (B) TYPE: Nucleic Acid
- (C) STRANDEDNESS: Double
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:19:

CCAGCACCTC CGGCATGTGA CCCCCGACTC CTAAATAAAC TGCTTCGTGA 50

CGACCACGTC CATCACGGC 69

(2) INFORMATION FOR SEQ ID NO:20:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 69 base pairs
- (B) TYPE: Nucleic Acid
- (C) STRANDEDNESS: Double
- (D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:20:

CCAGCACCGC CGGCATGTGA CCCCCGACTC CTAAATAAAC TGCTTCGTGA 50

CGATCATGTC TATCACGGT 69

(2) INFORMATION FOR SEQ ID NO:21:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 37 base pairs
- (B) TYPE: Nucleic Acid

(C) STRANDEDNESS: Single  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:21:

GCTAGCTCTA GAAATTGCTC CTCGTGGTCA TGCTTCT 37

(2) INFORMATION FOR SEQ ID NO:22:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 22 base pairs

(B) TYPE: Nucleic Acid

(C) STRANDEDNESS: Single

(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:22:

CAGTCTGCCG TGAAGGACAT GG 22

(2) INFORMATION FOR SEQ ID NO:23:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 amino acids

(B) TYPE: Amino Acid

(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:23:

Ser Pro Ala Pro Pro Ala Cys Asp Leu Arg Val Leu Ser Lys Leu  
1 5 10 15

Leu Arg Asp Ser His Val Leu His  
20 23

(2) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 23 amino acids

(B) TYPE: Amino Acid

(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:24:

Ser Arg Leu Ser Gln Cys Pro Glu Val His Pro Leu Pro Thr Pro  
1 5 10 15

Val Leu Leu Pro Ala Val Asp Phe  
20 23

(2) INFORMATION FOR SEQ ID NO:25:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 23 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:25:

Ser Leu Gly Glu Trp Lys Thr Gln Met Glu Glu Thr Lys Ala Gln  
1 5 10 15  
Asp Ile Leu Gly Ala Val Thr Leu  
20 23

(2) INFORMATION FOR SEQ ID NO:26:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 20 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:26:

Leu Leu Glu Gly Val Met Ala Ala Arg Gly Gln Leu Gly Pro Thr  
1 5 10 15  
Cys Leu Ser Ser Leu  
20

(2) INFORMATION FOR SEQ ID NO:27:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 18 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:27:

Leu Gly Gln Leu Ser Gly Gln Val Arg Leu Leu Leu Gly Ala Leu  
1 5 10 15  
Gln Ser Leu  
18

(2) INFORMATION FOR SEQ ID NO:28:

(i) SEQUENCE CHARACTERISTICS:  
(A) LENGTH: 21 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:28:

Leu Gly Thr Gln Leu Pro Pro Gln Gly Arg Thr Thr Ala His Lys  
1 5 10 15

Asp Pro Asn Ala Ile Phe  
20 21

(2) INFORMATION FOR SEQ ID NO:29:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 25 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:29:

Leu Ser Phe Gln His Leu Leu Arg Gly Lys Val Arg Phe Leu Met  
1 5 10 15

Leu Val Gly Gly Ser Thr Leu Cys Val Arg  
20 25

(2) INFORMATION FOR SEQ ID NO:30:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 25 amino acids  
(B) TYPE: Amino Acid  
(D) TOPOLOGY: Linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:30:

Ser Pro Ala Pro Pro Ala Cys Asp Pro Arg Leu Leu Asn Lys Leu  
1 5 10 15

Leu Arg Asp Asp His Val Leu His Gly Arg  
20 25